

Solar Cooker and Heater

The Solar Cooker is an economical and easy to build solar radiation collection system with the ability to produce high radiation energy. The system consists of a main primary radiation reflector and a secondary radiation reflector that are made from reflective materials such as: mylar, film, mirror, metal etc. The secondary reflector is much smaller than the main reflector. The primary reflector sheet is curved (bent) to be close to as a parabolic form as possible and reflects the radiation in linear form (line) to the secondary reflector. The secondary reflector, which is curved (bent) at a 90degree angle from the main reflector, transfers and changes the linear reflected line to a point (spot, smaller area). The primary and secondary reflectors are design to be in a fixed position and/or adjustable, movable and detachable. Both the primary and or secondary reflector has a mechanism for adjusting the inclination for focusing purposes. The system accommodates multiple primary reflectors that are focused on a secondary reflector to produce more radiation energy. The system is designed to be a sole energy producer or an auxiliary energy generator for the solar ovens that are designed to collect radiation from the top.

The Claim is:

- 1- The system consists of a primary reflector that reflects radiation in a linear form to the secondary reflector. The secondary reflector converts the linear line or lines to a point or spot. The main reflector consists of a sheet of reflector curved close to parabolic, to focus radiation to in a line form. If the curve of the reflector sheet is a perfect parabolic curve, the line produced is a sharp line. The curvature of the reflector sheet does not have to be perfect parabolic curves. If the curve of the primary sheet is not a perfect parabolic then the lines of various thickness will be produced depending on the roughness and closeness to a parabolic curve. The secondary reflector is curved (bent) in a 90 degrees angle from the primary reflector. The reflected radiation line from the primary reflector is changed by the secondary reflector and focused to a spot (point). A perfect parabolic curved sheet produces sharper line from the main reflector to secondary. In return it means a sharper point from the secondary reflector and higher radiation energy.
- 2- The system in claim 1, accepts multiple primary reflectors; each of which are focused on a secondary reflector.
- 3- The system in Claim 1 accommodates electronic circuits, sensors and servomotors to align the reflectors to the sun during the day. Or, the inclination of the primary reflector is controlled by supporting rod or by means of a locking mechanism.
- 4- The primary reflector in Claim 1 accommodates inclination adjustability and can be mounted in a fixed position and the secondary reflector is adjustable and movable to obtain the desired maximum radiation. For manual operation, the primary reflector accommodates wheels for ease of movement.
- 5- The length of the secondary reflector is longer than the width of the widest primary reflector. The secondary reflector is even larger, if to accommodate different positions of the sun and multiple numbers of primary reflectors.

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- 6- The secondary reflector accommodates inclination adjustability and can be mounted in a fixed location and the primary reflector is adjustable and movable to obtain desired focus and radiation. If the secondary reflector optionally has an elongated parabolic shape, it will add to the efficiency of the Claim 1 system.
- 7- The secondary reflector is housed in proper heat resisting materials and covered on the other three sides for safety.
- 8- The system in Claim 1 is easy to use and heats from the bottom; like cooking on a grill.
- 9- The secondary reflector accommodates adjusting the amount of radiation by controlling the focal point. A mechanism to squeeze and /or release is used to control and change the focal point.
- 10- The secondary reflector's housing unit accommodates electric coils for cooking when there is limited solar radiation.
- 11- The system in Claim 1 is easy to manufacture when compared to parabolic dishes or some other concave options.
- 12- The system in Claim 1 is accommodating and serves as an auxiliary heating system for the solar oven which collects radiation from the top.
- 13- The system in Claim 1 is accommodating and serves as water heater by placing a water tank in place of an oven unit.
- 14- The system in Claim 1 accommodates and serves as a heat generator for electric power or to provide power to a power storage depot.
- 15- The system in Claim 1 accommodates an all-in-one unit. That is the primary reflector is in the bottom and the secondary reflector is a lens type reflector and located just under the cooking surface.
- 16- The principle of operation of primary reflector in Claim 1 accommodates a large reflector surface providing more radiation energy for the ovens or energy depot (water tanks) that collects radiation from the top.

Background of invention:

The system is one of the most economical methods of harnessing the radiation from the sun. The system acts like a huge magnifying glass or a dish in the size of the primary reflector which is focused to produce energy.

Most of the related US Patents are based on heating from the top where sun energy is collected and others use parabolic dish type collectors to collect solar radiation.

US Pat No.3938497 to Andrassy discloses a moveable apparatus to find a favorable position of the sun. Likewise US Pat. No 4,111,184 discloses how a parabolic reflector is adjusted to the sun.

US Pat. No. 4,249,511 to Krisst et al. discloses a parabolic dish reflector which acts as a grill in focal point.

US Pat. No. 4,696,285 to Zwach discloses a primary and a secondary parabolic dish which reflect the radiation from the top.

US Pat. No. 4,848,320 to Burn et al. discloses a collapsible reflector with a self-leveling tray to keep the food level within the interior of the oven.

US Pat. No. 4,841,946 to Marks discloses dish type solar collector an heater and the movements of the unit is controlled electronically.

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Summary

The invention is a solar heating and cooking system which uses a curved (bent) sheet of material with reflective surface that reflects radiation energy in a line form. The secondary reflector that is a much smaller reflector, in turn reflects the line to a point. The system heats and cooks from the bottom just like a grill. The system is economical and easy to manufacture.

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August 11, 2003

Brief description of the drawings:

Fig. 1 shows the principle of operation. The sun radiation energy is reflected to the secondary reflector in a line form. The secondary reflector changes the reflected line to a point, the focal point, the hot spot. The system works and acts as if you have a magnifying glass in the size of primary reflector.

In the system, the cooking and heating is simple because the hot spot is under the cooking and heating surface like a stove.

Fig. 2 shows the side view of the system. In this figure, a solar oven (3) is shown over the heating surface. The support of primary reflector depends on the mechanism used to orient and collect maximum solar energy. Simple ways of supporting the primary reflector are shown here. For a windy place stronger supports are needed. The secondary reflector changes the reflected line to a point, the heating spot. The heating unit is either an oven, heater or heating depot. The housing unit size and height will depend on the usage.

Fig. 3 shows the prototype for testing. The heat generated in this simple setup was over 400degree F under a glass cover in open air.

Fig. 4 shows the close up of a secondary reflector in a housing unit. The curvature and inclination of the secondary reflector are controlled and adjusted in the housing unit.